

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

5 Applicant(s): Gerrit W. Hiddink
Case: 2
Serial No.: 10/751,376
Filing Date: January 5, 2004
Group: 2618
10 Examiner: Nguyen Thanh Vo

Title: Predictive Method and Apparatus for Antenna Selection in a Wireless
Communication System

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APPEAL BRIEF

20 Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

25 Sir:

Applicant hereby appeals the final rejection dated May 15, 2007, of claims 1-7, 11, 13-18, and 22-25 of the above-identified patent application.

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REAL PARTY IN INTEREST

The present application is assigned to Agere Systems Inc., as evidenced by an assignment recorded on June 10, 2004 in the United States Patent and Trademark Office at Reel 015456, Frame 0279. The assignee, Agere Systems Inc., is the real party in interest.

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RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF CLAIMS

40 The present application was filed on January 5, 2004 with claims 1 through 25. Claim 12 was cancelled in the Amendment And Response to Office Action dated October 12,

2006, and claims 8-10 and 19-21 were cancelled in the Amendment And Response to Office Action dated April 22, 2007. Claims 1-7, 11, 13-18, and 22-25 are presently pending in the above-identified patent application. Claims 1-4, 6-7, 11, 13-16, 18, and 22-24 are rejected under 35 U.S.C. §102(b) as being anticipated by Crawford (United States Patent Application 5 Publication Number 2003/0002471 A1), and claims 5, 17, and 25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Crawford. Claims 1, 5, 13, 17, 23, and 25 are being appealed.

STATUS OF AMENDMENTS

10 There have been no amendments filed subsequent to the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to wireless communication device (page 3, lines 24-27; FIG. 2: 200), comprising: a plurality of antennas (page 4, lines 22-25); and a predictive antenna selector (FIG. 2: 400) that evaluates a signal quality of each of the plurality of antennas of at least a portion of one prior frame (page 4, line 25, to page 5, line 2) and selects an antenna to communicate one or more frames based on the signal quality evaluation (page 5, line 29, to page 6, line 2), wherein the predictive antenna selector evaluates the signal quality (FIG. 4: 410) of each of the plurality of antennas based on a weighted schedule (page 5, lines 12-16).

Independent claim 13 is directed to method for wireless communication on one of a plurality of antennas (page 4, lines 22-25), comprising the steps of: evaluating a signal quality (FIG. 4: 410) of each of the plurality of antennas of at least a portion of one prior frame based on a weighted schedule (page 4, line 25, to page 5, line 2; page 5, lines 12-16); and selecting an antenna to communicate one or more frames based on the signal quality evaluation for at least one prior frame (page 5, line 29, to page 6, line 2).

Independent claim 23 is directed to predictive antenna selector (FIG. 2: 400) for use in a wireless communication device (page 3, lines 24-27; FIG. 2: 200), comprising: means for evaluating a signal quality (FIG. 4: 410) of a plurality of antennas (page 4, lines 22-25) of at least a portion of one prior frame based on a weighted schedule (page 4, line 25, to page 5, line 2; page 5, lines 12-16); and means for selecting an antenna to communicate one or more frames

based on the signal quality evaluation for at least one prior frame (page 5, line 29, to page 6, line 2).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

5 Claims 1-4, 6-7, 11, 13-16, 18, and 22-24 are rejected under 35 U.S.C. §102(b) as being anticipated by Crawford, and claims 5, 17, and 25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Crawford.

ARGUMENT

10 Independent Claims 1, 13 and 23

Independent claims 1, 13, and 23 are rejected under 35 U.S.C. §102(b) as being anticipated by Crawford. Regarding claim 1, the Examiner asserts that Crawford discloses a predictive antenna selector that evaluates a signal quality of each of said plurality of antennas based on a weighted schedule (see, paragraphs [0155], [0156], [0163], and [0165] which clearly discloses that an antenna which has poor signal quality during a previous interval will not be scheduled to be evaluated in the next interval; since the schedule for each antenna is not fixed, it reads on weighted schedule as claimed).

20 Applicant notes that a “weight” is defined as a “factor assigned to a number in a computation, as in determining an average, to make the number's effect on the computation reflect its importance.” (See, dictionary.com) In the text cited by the Examiner, Crawford teaches that,

25 as an example, assume that $L=5$ receive branches are available. This means that there are a total of $5*4/2=10$ possible chi values that need to be considered. Assume further that the best 6 chi terms are (in descending order of quality): $\lambda_{1,2}$, $\lambda_{2,3}$, $\lambda_{1,4}$, $\lambda_{2,5}$, $\lambda_{4,5}$ and $\lambda_{1,5}$. During the next opportunity to evaluate the receiver branch selection metrics, *the last two chi terms ($\lambda_{4,5}$, and $\lambda_{1,5}$) are dropped and two of the remaining pair possibilities are examined instead. $\lambda_{1,3}$, $\lambda_{2,4}$, $\lambda_{3,4}$ and $\lambda_{3,5}$.*

30 Thus, if there are $L=6$ antennas available, the diversity antenna selection can be based on 4 antennas' measurements (i.e., 6 chi terms) and then the remaining pairs are swapped with the other 2 worst antennas for the next diversity antenna selection performed using subsequent received bursts, again, either later in the same frame or in the next MAC frame. (Paragraph [0155]-[0156]; emphasis added.)

Crawford does *not*, however, disclose or suggest “weights,” and does *not* disclose or suggest that the signal quality of each of a plurality of antennas are evaluated based on a weighted schedule. Independent claims 1, 13, and 23 require that the signal quality of each of a plurality of antennas are evaluated “based on a ***weighted schedule***.”

5 Thus, Crawford does not disclose or suggest that the signal quality of each of a plurality of antennas are evaluated based on a weighted schedule, as required by independent claims 1, 13, and 23.

Claims 5, 17 and 25

Claims 5, 17, and 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Crawford. In particular, the Examiner acknowledges that Crawford fails to disclose removing a given antenna from evaluation if the signal quality of the given antenna is below a signal quality of a remainder of the plurality of antennas by a predefined amount, but asserts that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Crawford such that a given antenna is removed from evaluation if the signal quality of the given antenna is below a signal quality of a remainder of the plurality of antennas by a predefined amount in order to avoid ping-pong or bouncing effect.

Appellants note that the ping-pong effect would conventionally be addressed by comparing the signal quality of an antenna to an *absolute value of a predetermined signal quality*, as would be apparent to a person of ordinary skill in the art. Appellants maintain, however, that removing a given antenna from evaluation if the signal quality of the given antenna is below a signal quality of a remainder of the plurality of antennas by a predefined amount would not be obvious to a person of ordinary skill in the art.

Thus, Crawford does not disclose or suggest wherein said predefined criteria evaluates whether a signal quality of a given antenna is below a signal quality of a remainder of said plurality of antennas by a predefined amount, as required by claims 5, 17, and 25.

Conclusion

The rejections of the cited claims under sections 102 and 103 in view of Crawford are therefore believed to be improper and should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to

the independent claims.

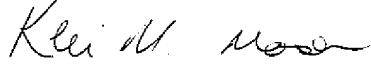
The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

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Date: November 1, 2007

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APPENDIX

1. A wireless communication device, comprising:

a plurality of antennas; and

5 a predictive antenna selector that evaluates a signal quality of each of said plurality of antennas of at least a portion of one prior frame and selects an antenna to communicate one or more frames based on said signal quality evaluation, wherein said predictive antenna selector evaluates said signal quality of each of said plurality of antennas based on a weighted schedule.

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2. The wireless communication device of claim 1, wherein said predictive antenna selector evaluates a signal quality of each of said plurality of antennas during a preamble portion of a frame.

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3. The wireless communication device of claim 1, wherein said predictive antenna selector evaluates a signal quality of each of said plurality of antennas for up to an entire frame duration.

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4. The wireless communication device of claim 1, wherein said predictive antenna selector removes a given antenna from said evaluation if said given antenna fails to satisfy predefined criteria.

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5. The wireless communication device of claim 4, wherein said predefined criteria evaluates whether a signal quality of a given antenna is below a signal quality of a remainder of said plurality of antennas by a predefined amount.

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6. The wireless communication device of claim 4, wherein a signal quality of said removed antenna is subsequently evaluated to determine when to return said removed antenna to said plurality of antennas that are evaluated.

7. The wireless communication device of claim 1, wherein said signal quality of said plurality of antennas is recorded in a table.

8. (Cancelled)

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9. (Cancelled)

10. (Cancelled)

10 11. The wireless communication device of claim 1, wherein said device is implemented in accordance with an IEEE 802.11 Standard.

12. (Cancelled)

15 13. A method for wireless communication on one of a plurality of antennas, comprising the steps of:

evaluating a signal quality of each of said plurality of antennas of at least a portion of one prior frame based on a weighted schedule; and

20 selecting an antenna to communicate one or more frames based on said signal quality evaluation for at least one prior frame.

14. The method of claim 13, wherein said evaluating step evaluates a signal quality of each of said plurality of antennas during a preamble portion of a frame.

25 15. The method of claim 13, wherein said evaluating step evaluates a signal quality of each of said plurality of antennas for up to an entire frame duration.

16. The method of claim 13, wherein said selecting step removes a given antenna from said evaluation if said given antenna fails to satisfy predefined criteria.

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17. The method of claim 16, wherein said predefined criteria evaluates whether a signal quality of a given antenna is below a signal quality of a remainder of said plurality of antennas by a predefined amount.

5 18. The method of claim 13, further comprising the step of recording said signal quality of said plurality of antennas in a table.

19. (Cancelled)

10 20. (Cancelled)

21. (Cancelled)

15 22. The method of claim 13, wherein said method is implemented in accordance with an IEEE 802.11 Standard.

23. A predictive antenna selector for use in a wireless communication device, comprising:

20 means for evaluating a signal quality of a plurality of antennas of at least a portion of one prior frame based on a weighted schedule; and

means for selecting an antenna to communicate one or more frames based on said signal quality evaluation for at least one prior frame.

24. The predictive antenna selector of claim 23, wherein a given antenna is removed from said evaluation if said given antenna fails to satisfy predefined criteria.

25. The predictive antenna selector of claim 24, wherein said predefined criteria evaluates whether a signal quality of a given antenna is below a signal quality of a remainder of said plurality of antennas by a predefined amount.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.